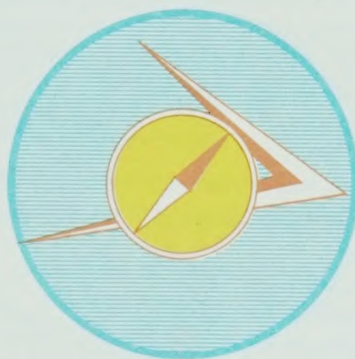
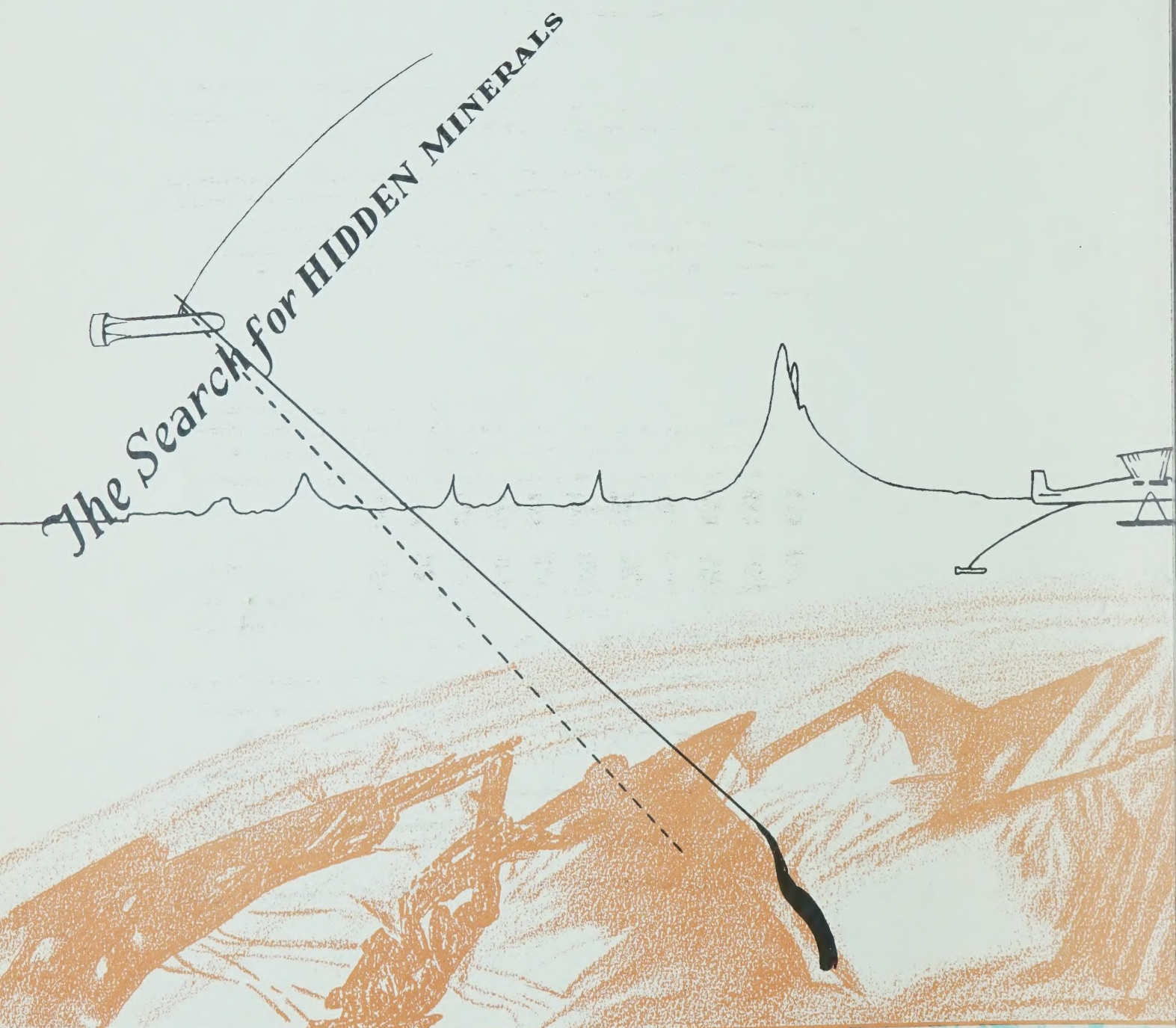


AR36



**G E O P H Y S I C A L**  
**E N G I N E E R I N G**  
**AND**  
**S U R V E Y S   L I M I T E D**

# The Search for HIDDEN MINERALS



## Photogeology

**Photogeology** — a major tool in the early planning of any exploration project — of continuing use throughout the entire exploration program.



## Scientific Prospecting

The Canadian prospector has carried the search for mineral deposits to every corner of the country. Canada's great mining industry is a monument to his efforts and so diligently has he pursued his work that few rock outcrops have not been scratched by the prospector's pick.

Today, in Canada and elsewhere, to meet the ever increasing demand for minerals it has become necessary to extend this search beneath lakes, swamps and glacial drift where the prospector's pick and shovel could not probe.

The challenge of modern mineral exploration can be adequately met only through the integrated use of modern instruments, operating techniques and methods of interpretation. Research, economic studies, geological and geophysical mapping and interpretation all play a part in the well planned, economical program of mineral exploration.

Geophysical Engineering uses a balanced scientific approach in property selection and investigation of unexplored territory.

1. Early planning consists of research into government and private reports, geological and topographical maps and naturalists records. This work is correlated with geological interpretation of aerial photographs and broad regions are defined for airborne surveys.
2. Once preliminary research has indicated that a particular region possesses a favourable geological environment, it may be flown in reconnaissance and a number of areas within the region selected on the basis of a new geological interpretation.
3. More detailed airborne geophysical work is then carried out usually accompanied by some ground investigation to guide interpretation.
4. On the basis of this more detailed study, a number of properties are selected. These are subjected to detailed geophysical investigations and geological mapping accompanied by stripping and trenching.
5. Mineralized areas are then evaluated by diamond drilling.

Particular attention is given to the geology, structure, and origin of the mineral deposits, and field studies are supplemented by laboratory investigations.

**This systematic approach has proved successful in locating and outlining hidden orebodies and their extensions.**





X-RAY AND  
PETROGRAPHIC ANALYSIS



# GEOPHYSICAL

OFFERS A COMPLETE SERVICE TO

## PLANNING & CONSULTATION

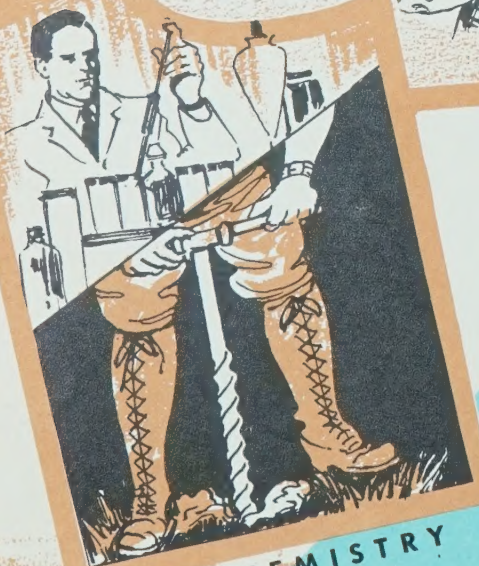


## INSTRUMENT RESEARCH



## AND MANUFACTURE

## INTERPRETATION



## GEOCHEMISTRY

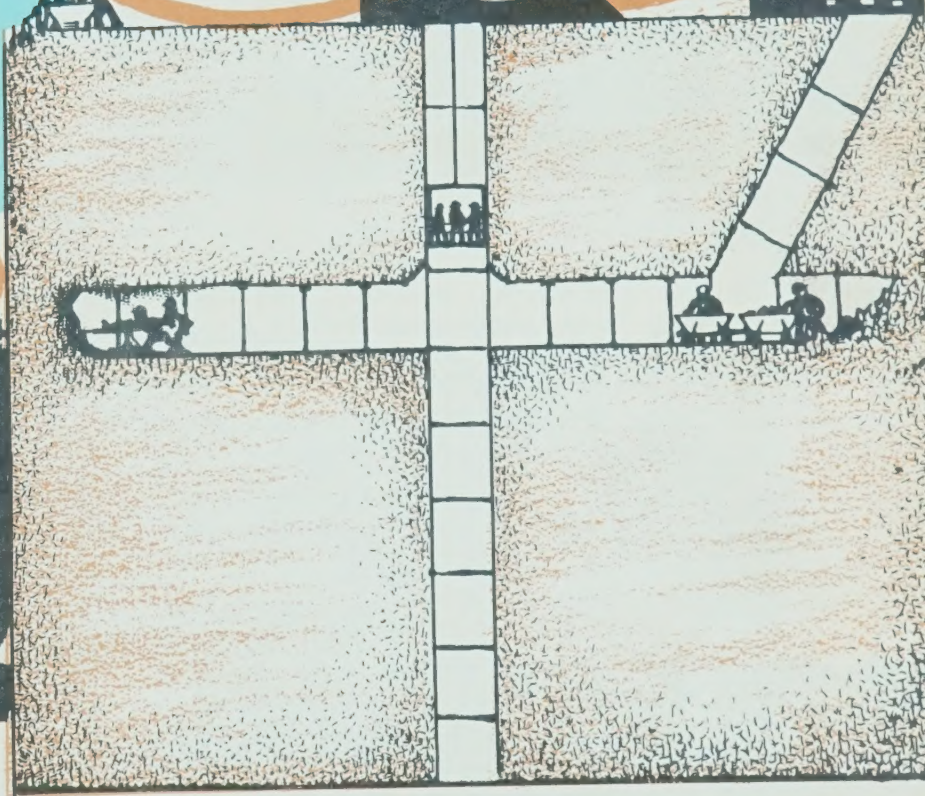
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# ENGINEERING

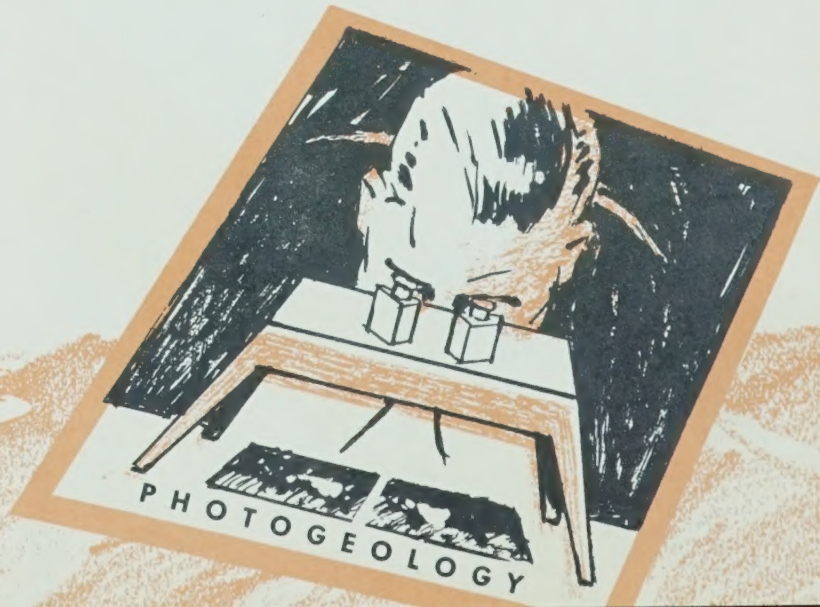
## THE MINING INDUSTRY

G E O P H Y S I C S



MINING  
DEVELOPMENT AND MANAGEMENT

O P H Y S I C S





## Project Planning & Exploration Management



Geophysical Engineering has personnel of world-wide experience, the most advanced geophysical instruments, modern laboratories, aircraft, and is equipped to plan and execute mineral exploration and programs in any location.

The planning phase may involve the delineation of areas geologically favourable for the occurrence of metallic or non-metallic minerals sought by the client followed by the complete planning, organization and execution of the program in the field. Geophysical Engineering's staff maintains continuous liaison with the client.

Equal care and attention is given to the project whether it be a remote concession of 1000 square miles or a single mining claim.

From the planning stage through to mine development, Geophysical Engineering has the personnel, instrumentation and the techniques to manage the exploration program for the client.

### Geophysical Exploration

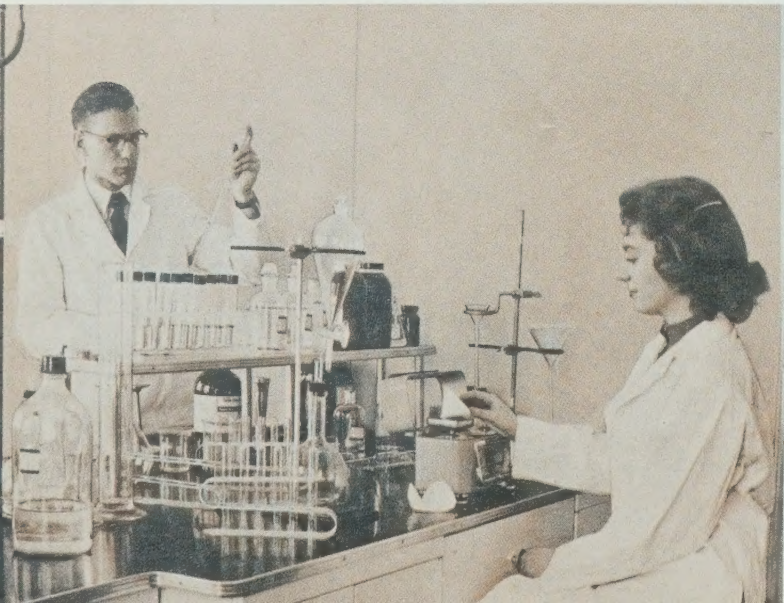
The key to successful geophysical exploration lies in one factor: **experience**. Technical training in geology, physics and mathematics, and a practical knowledge of the use of all types of geophysical surveys under varied geological and topographical conditions are necessary. Only then can a particular problem be analyzed and the best use made of the various geophysical methods and techniques available.

In recent years, the methods of applied geochemistry have been developed to the point where they are exceptionally valuable tools in the search for base metal mineral deposits. These methods are particularly useful in southern climates but they are also applicable and have met with success



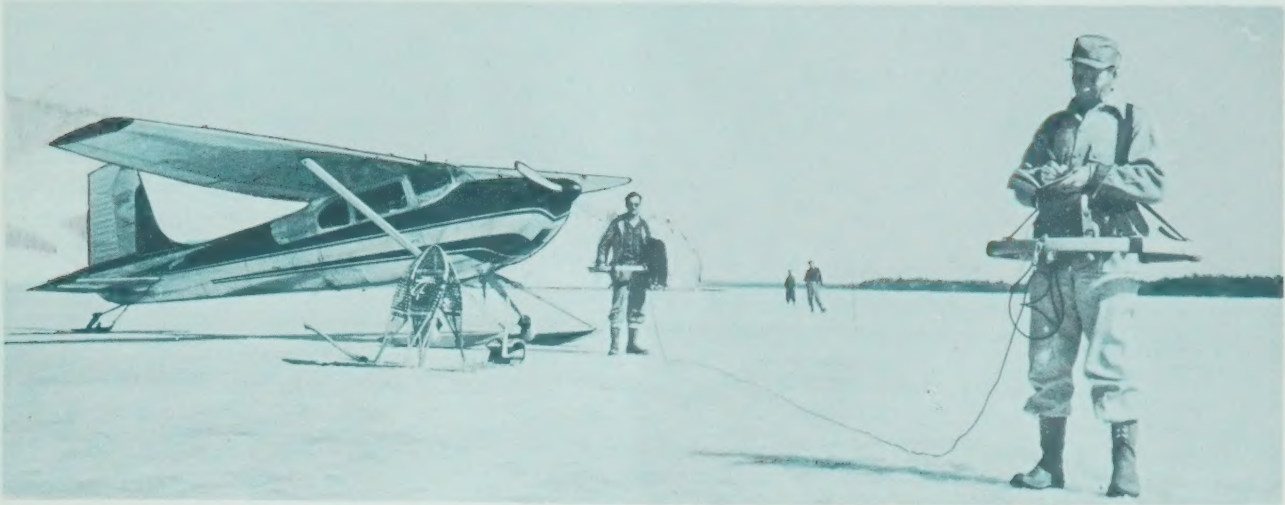
in the glaciated regions of Canada and the northern United States. Soil sampling, which is the method most commonly used, has located several new mineral deposits. The photograph at the left shows the method of analysing soil samples in Geophysical Engineering laboratories at North Bay.

The photograph above shows the diamond drill test of a geochemical anomaly in Jamaica where porphyry-type copper deposits were discovered for the first time in this region by means of geochemistry.





## The Geophysical Survey



### .... In The Air

Airborne geophysical methods are particularly applicable where it is desirable to obtain rapid reconnaissance-type evaluations of large areas and provide focal points for more detailed investigation by ground methods. The airborne magnetometer provides a regular indication of geological structure as well as outlining concentrations of magnetic minerals, the electromagnetic method may indicate important sulphide deposits, and the airborne scintillometer provides data on the radioactivity of the formations traversed.

### ... On The Ground

A variety of geophysical methods and variations of particular methods are available as aids in locating mineral deposits. The geophysicist must be able to choose those methods which are best suited to solving the particular problem confronting him. This cannot be left to inexperienced personnel.

Geophysical methods use differences in physical properties of rocks and minerals to map geological features and locate mineral deposits. These differences are measured with precision instruments and plotted in useable form. Physical properties used in various types of surveys include: magnetic permeability (magnetic surveys); conductivity (resistivity and electromagnetic surveys); ion concentration (self-potential surveys); density (gravity surveys); radio-activity (scintillometer surveys); elastic constants (seismic); heavy metal concentrations in soil, water or plants (geochemical surveys).

### ... Interpretation

The most important phase of either an airborne or ground geophysical survey is the interpretation of the results. To obtain maximum benefit from the geophysical data it must be carefully studied by experts trained in geology as well as physics and mathematics, experts who also have had extensive practical field experience with all forms of geophysical surveys.

The experienced consultant uses the geophysical data as a geological tool and can in many cases, estimate the probability of finding an orebody in the area covered by the geophysical results. The experienced physicist may use the data to calculate the width, length of the body and depth below the surface. Further calculations may also be made which give clues to the composition of the body. Then the chief geologist on the interpretation staff makes the final recommendations.







## Mining

A well planned exploration program proceeds in logical sequence from the general to the specific. Thus in the initial stages the co-ordinated use of aerial photography, geology and geophysics will quickly and economically focus attention on relatively small areas of high favourability. Successive stages subject these selected areas to increasingly closer scrutiny as the process of evaluation continues, and exploration progresses to development and operating.

In the final stages, experienced mine operating personnel on the staff of Geophysical Engineering & Surveys Limited are prepared to carry the evaluation through the successive stages of development and to plan and supervise plant design, plant construction and mining operations.

## Consulting

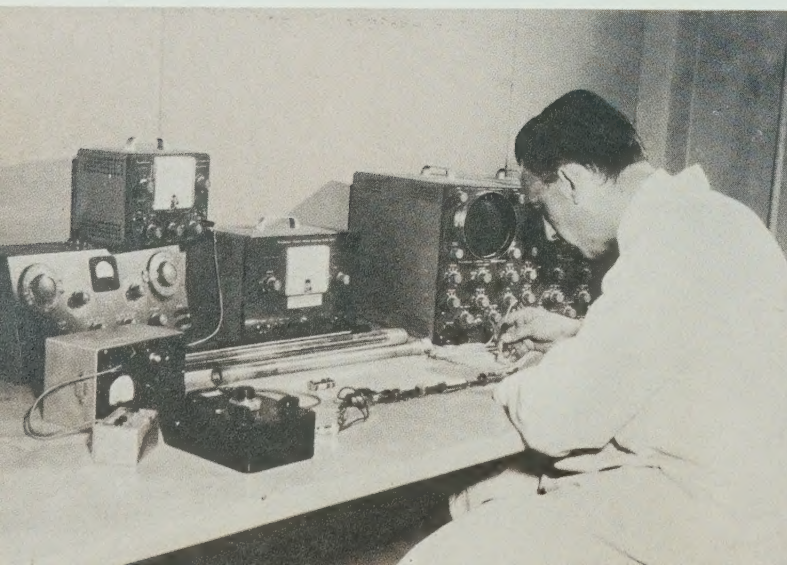
A general consulting service is offered to the mining industry. Geophysical Engineering is prepared to make property examinations, study and log diamond drill core, evaluate the results of diamond drilling or other work programs, review and interpret geophysical data and provide independent reports on mining operations in any phase of exploration or development.

Petrographic and mineralogical studies at the North Bay laboratories constitute a valuable adjunct to the general consulting services.

Often the fresh viewpoint combined with sound technical background and extensive experience can result in the solution of the most complex problems of mining geology.



## Instrument Research and Manufacture



Since its inception Geophysical Engineering has felt the need for improved instrumentation in the field of geophysics. Instruments generally in use were found to be of poor design, difficult to maintain at maximum accuracy and unduly heavy. Accordingly, a modern electronics laboratory has been established at North Bay solely for the development of improved geophysical instruments and techniques for both ground and airborne use.

Instruments developed in this laboratory constitute a most valuable contribution to the mining industry. They add materially to the quality of the technical data being provided by Geophysical Engineering field parties.



## Geophysics has led to many successes . . .



Temagami open pit, showing the No. 1 high-grade copper orebody discovered by geophysical methods . . . \$2,400,000. net smelter returns from the first 14,000 tons of direct shipping ore.

**Mining Geophysics** in recent years has been responsible for the discovery of so many new ore deposits that it is now accepted as an essential tool in any mining exploration program. The role of geophysics in mining is roughly comparable to that of geophysics in petroleum exploration in 1929 when fears of depleting petroleum reserves were removed by a rapid succession of discoveries of new oil fields through geophysics.

**Geophysical Engineering** personnel have contributed directly to many recent discoveries, and with continuing improvements in interpretation methods, and technique, expect to contribute to many more.

**Clients** who have been served by Geophysical Engineering include: Anaconda, Noranda, Dome, Temagami, Frobisher, Dominion Gulf, Teck Explorations, Broulan Reef, Howey, Hard Rock, Anglo-Huronian, Hoyle, Alator, Conwest, Geo-Scientific, God's Lake, Little Long Lac, MacLeod Cockshutt, Mentor, Mining Geophysics, Newkirk Mining, Yellowknife Bear, and Hollinger.

**Operations** have been extensive in all parts of Canada including Newfoundland and the Yukon, in many parts of the United States of America, Alaska, Mexico, Costa Rica, Jamaica, Cuba, Puerto Rico, Colombia, Venezuela, Peru, the British Isles and Cyprus.





## **G E O P H Y S I C A L E N G I N E E R I N G**

**AND  
S U R V E Y S L I M I T E D**

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*CABLE ADDRESS "GEOPHYSICS"  
TORONTO*

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